

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1—4. Cancelled

5. (Currently Amended) A method for diagnosing impairments in a communication system, the method comprising:

accumulating statistical information about ~~the~~ an impairment ~~[[s]] type associated~~  
with an impairment source;

creating an initial a priori statistical model associated with the impairment type and  
impairment source based upon the accumulated statistical information;

creating an a posteriori statistical model of the impairment type by collecting a  
plurality of probability density functions corresponding to a signal-to-noise ratio ~~of different~~  
~~combinations of~~ associated with the impairment~~[[s]] type~~ and from at least one signal line of  
the communication system;

creating an updated a priori statistical model~~[[s]]~~ based upon the a posteriori  
statistical model and the initial a priori statistical model; and

~~updating the a priori statistical models using a posteriori statistical models of the~~  
~~impairments.~~

using the updated a priori statistical model to diagnose the impairment type among  
signal lines of the communication system.

6. (Currently Amended) The method according to claim 5, wherein the impairment~~[[s]] type~~  
~~are~~ is an external (out of domain) impairment~~[[s]] type~~.

7. (Currently Amended) The method according to claim 6, wherein the external  
impairment~~[[s]] are~~ source associated with the external impairment type is one of AM  
radio interference[[s]] and thermal interference.

8. (Cancelled)

9. (Currently Amended) The method according to claim 6 further comprising determining a presence of an external impairment type by detecting evaluating at least one of a rate of signal to noise ratio change and number of lines disturbed.
10. (Previously Presented) The method according to claim 6, wherein the communication system is a Digital Subscriber Line (DSL) system.
11. (Currently Amended) The method according to claim 5, wherein the impairment[[s]] type are is an internal (in domain) impairment[[s]] type.
12. (Previously Presented) The method according to claim 11, wherein the communication system is a Digital Subscriber Line (DSL) system.
13. (Previously Presented) The method according to claim 12 further comprising collecting statistical data about an aggregate signal-to-noise ratio of the communication system.
14. (Currently Amended) The method according to claim 13, wherein the statistical data about the aggregate signal-to-noise ratio of the communication system comprises a plurality of distinct probability density functions corresponding to the signal-to-noise ratio of different combinations of ~~the~~ internal impairment[[s]] types and at least one signal line of the DSL system.
15. (Currently Amended) The method according to claim 12 further comprising collecting statistical information about ~~the~~ aggregate power attenuation values.
16. (Previously Presented) The method according to claim 5 further comprising performing a statistical parameter estimation.
17. (Previously Presented) The method according to claim 5 further comprising performing a hypothesis test.
18. (Currently Amended) The method according to claim 5[[1]], wherein the communication system is a Digital Subscriber Line system.

19. (Previously Presented) A computer readable medium containing executable instructions which, when executed in a processing system, cause said system to perform a method comprising:
- compiling statistical models of physical layers of a communication system;
  - collecting a plurality of probability density functions corresponding to a signal-to-noise ratio of different combinations of the impairments and at least one signal line of the communication system;
  - creating at least one a priori distribution;
  - storing the statistical models and the a priori distribution in a storage medium; and
  - diagnosing at least one impairment in the communication system using the statistical models and the a priori distribution.
20. (Currently Amended) A computer readable medium containing executable instructions which, when executed in a processing system, cause said system to perform a method for diagnosing impairments in a communication system, the method comprising:
- accumulating statistical information about the an impairment [[s]] type associated with an impairment source;
  - creating an initial a priori statistical model associated with the impairment type and impairment source based upon the accumulated statistical information;
  - creating an a posteriori statistical model of the impairment type by collecting a plurality of probability density functions corresponding to a signal-to-noise ratio of different combinations of associated with the impairment[[s]] type and from at least one signal line of the communication system;
  - creating an updated a priori statistical model[[s]] based upon the a posteriori statistical model and the initial a priori statistical model; and
  - updating the a priori statistical models using a posteriori statistical models of the impairments.
  - using the updated a priori statistical model to diagnose the impairment type among signal lines of the communication system.
21. (Currently Amended) The computer readable medium according to claim 20, wherein the impairment[[s]] type ~~are~~ is an external (out of domain) impairment[[s]] type.

22. (Previously Presented) The computer readable medium according to claim 20 further comprising detecting a signal to noise ratio change.
23. (Currently Amended) The computer readable medium according to claim 20, wherein the impairment[[s]] type ~~are~~ is an internal (in domain) impairment[[s]] type.
24. (Previously Presented) The computer readable medium according to claim 23, wherein the communication system is a Digital Subscriber Line (DSL) system.
25. (Previously Presented) The computer readable medium according to claim 23 further comprising collecting statistical data about an aggregate signal-to-noise ratio of the communication system.
26. (Previously Presented) The computer readable medium according to claim 25, wherein the statistical data about the aggregate signal-to-noise ratio to the communication system comprises a plurality of distinct probability density functions corresponding to the signal-to-noise ratio of different combinations of ~~the~~ internal impairment[[s]] types and at least one signal line of the DSL system.
27. (Previously Presented) The computer readable medium according to claim 23 further comprising collecting statistical information about ~~the~~ aggregate power attenuation values.
28. (Previously Presented) The computer readable medium according to claim 20 further comprising performing a statistical parameter estimation.
29. (Previously Presented) The computer readable medium according to claim 20 further comprising performing a hypothesis test.
30. (Currently Amended) An article of manufacture comprising a program storage medium readable by a computer and tangibly embodying at least one program of instructions executable by said computer to perform a method comprising:
  - compiling statistical models of physical layers of a communication system;

collecting a plurality of probability density functions corresponding to a signal-to-noise ratio of different combinations of ~~the~~ impairments associated with impairment sources and at least one signal line of the communication system;

creating at least one a priori distribution;

storing the statistical models and the a priori distribution in a storage medium; and

diagnosing at least one impairment source in the communication system using the statistical models and the a priori distribution.

31. (Currently Amended) An article of manufacture comprising a program storage medium readable by a computer and tangibly embodying at least one program of instructions executable by said computer to perform a method for diagnosing impairments in a communication system, the method comprising:

accumulating statistical information about ~~the~~ an impairment [[s]] type associated with an impairment source;

creating an initial a priori statistical model associated with the impairment type and impairment source based upon the accumulated statistical information;

creating an a posteriori statistical model of the impairment type by collecting a plurality of probability density functions corresponding to a signal-to-noise ratio of different combinations of associated with the impairment[[s]] type and from at least one signal line of the communication system;

creating an updated a priori statistical model[[s]] based upon the a posteriori statistical model and the initial a priori statistical model; and

~~updating the a priori statistical models using a posteriori statistical models of the impairments.~~

using the updated a priori statistical model to diagnose the impairment type among signal lines of the communication system.

32. (Currently Amended) The article of manufacture according to claim 31, wherein the impairment[[s]] type ~~are~~ is an external (out of domain) impairment[[s]] type.

33. (Previously Presented) The article of manufacture according to claim 31 further comprising detecting a signal to noise ratio change.

34. (Currently Amended) The article of manufacture according to claim 31, wherein the impairment~~[[s]] type are~~ is an internal (in domain) impairment~~[[s]] type~~.
35. (Previously Presented) The article of manufacture according to claim 34, wherein the communication system is a Digital Subscriber Line (DSL) system.
36. (Previously Presented) The article of manufacture according to claim 34 further comprising collecting statistical data about an aggregate signal-to-noise ratio of the communication system.
37. (Currently Amended) The article of manufacture according to claim 36, wherein the statistical data about the aggregate signal-to-noise ratio of the communication system comprises a plurality of distinct probability density functions corresponding to the signal-to-noise ratio of different combinations of the internal impairment~~[[s]] types~~ and at least one signal line of the DSL system.
38. (Previously Presented) The article of manufacture according to claim 34 further comprising collecting statistical information about the aggregate power attenuation values.
39. (Previously Presented) The article of manufacture according to claim 31 further comprising performing a statistical parameter estimation.
40. (Previously Presented) The article of manufacture according to claim 31 further comprising performing a hypothesis test.